Welcome to Bausch and Lomb’s monthly research update.

With our background in clinical ophthalmic research, mainly of the anterior eye, Bausch and Lomb have asked us to produce an independent report of some of the interesting findings coming out of the research journals each month. As a busy practitioner, this should allow you to keep more up-to-date with cutting edge clinical research and allow you to locate the articles when you want to know more about a topic highlighted.

Issue 27

The following key clinical peer reviewed journals are reviewed in this update:

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Simulating IOL designs using adaptive optics

The authors used adaptive optics to simulate different IOL designs in order to evaluate the potential correction of manifest wavefront aberrations. The results demonstrated that aspheric aberration-correcting and spherical IOLs provided comparable visual quality, when perfectly centered for eyes where the corneal higher-order aberrations are equivalent to those of the average human cornea. Tilt and decenteration of the IOL designs impacted on visual quality, with the aberration-correcting IOLs having a greater effect than the spherical IOL designs. A possible limitation to the study is that only 10 subjects were evaluated.

*Journal of Cataract and Refractive Surgery 38:947-958*

Validation of a new integrated aberrometry-topography system

This report evaluated the validity and repeatability of the new L80 videokeratographer (Visionix Luneau, Chartres, France). The results showed that the L80 device is a reliable objective instrument comparable to other commercially available autokeratometers, which, in addition, combines many other useful clinical features such as aberrometry. However, the L80 device provided slightly steeper horizontal (bias of 0.05 mm) and vertical (bias 0.07 mm) measurements compared to the traditional B&L keratometer. The authors suggested that incorporating an offset into the instrument could mitigate the difference between the two instruments to make them interchangeable.

*Journal of Optometry 5:80-86*

Comparing accommodating and asymmetric multifocal IOLs

In this study the investigators compared visual outcomes achieved with low-add-powered asymmetric, multifocal IOLs (31 patients) versus single-optic accommodating IOLs (35 patients). No significant differences in either uncorrected or corrected near visual acuity were found after surgery (p≥0.09). Although the accommodating group demonstrated better photopic contrast sensitivity over a range of spatial frequencies (p≤0.04), the multifocal group showed significantly better acuities at several defocus levels (using defocus curves measured at 4 m). This study therefore highlights the potential benefits and drawbacks of each IOL modality.

*Journal of Cataract and Refractive Surgery 38:978-985*
IOL calculations for patients with high myopia

This study assessed the accuracy of IOL power calculations from optical biometry using the Zeiss IOLMaster across a range of myopia levels in a population of 31 patients. The Haigis formula was used in all cases and was compared to back-calculated refraction results using the SRK/T and Holladay I formulae. The authors concluded that IOLMaster optical biometry provided reliable results for patients with high myopia, although there was an increasing lack of accuracy beyond an axial length of 30 mm. The Haigis formula was found to provide the best predictability of post-operative refractive outcomes for myopic eyes in general.

*Ophthalmic and Physiological Optics 32: 228-233*

Simultaneous cross-linking and topography-guided PRK for Keratoconus patients

This report evaluated the 1-year visual and topographic outcomes and efficacy of corneal collagen cross-linking (CXL) combined with topography-guided photorefractive keratectomy (TG-PRK) to achieve near emmetropia for 15 patients with mild keratoconus. The results demonstrate that the majority (55 %) of patients showed a significant improvement in corneal topography, with no cases showing further keratoconus progression. The authors concluded that this method offers a safe and efficacious treatment for the management of keratoconus patients.

*Journal of Refractive Surgery 28:341-345*

Comparing ICL implantation and LASIK in patients with low to moderate myopia

Kamiya and colleagues compared the post-operative visual function of 20 patients undergoing implantable collamer lens (ICL) implantation with 38 patients undergoing wavefront-guided LASIK (WG-LASIK). The results showed that ICL implantation resulted in lower manifest higher-order aberrations and larger areas under the log contrast sensitivity function than with WG-LASIK. The authors concluded that ICL implantation should be considered as a viable surgical option for patients with low to moderate myopia.

*American Journal of Ophthalmology 153:1178-1186*
Prevalence of sleep apnea in patients with keratoconus

This investigation assessed the prevalence of obstructive sleep apnea (OSA) in 362 keratoconus patients. All participants were administered a standardised questionnaire regarding their medical and ocular health status. Those without a history of OSA were administered the Berlin questionnaire to determine their risk of developing OSA. The results found that keratoconus patients showed a higher prevalence of OSA compared to the general population. Furthermore, keratoconic patients without previous diagnosis of OSA were found to be at a higher risk of developing the condition.

*Cornea 31:595-599*

Bevacizumab for Macular Oedema in Central Retinal Vein Occlusion

The authors evaluated the efficacy of intraocular injections with Bevacizumab in 60 patients with macular oedema (MO) secondary to central retinal vein occlusion (CRVO). Patients were randomised at a ratio of 1:1 to receive intraocular injections of either Bevacizumab or a placebo every 6 weeks for 6 months. At the end of follow-up period, 60.0 % of the study group had gained ≥15 letters compared with only 20.0 % in the control group (p≤0.003). Best-corrected visual acuity improved by 14 letters at 24 weeks compared with a decrease of 2 letters in the control group (p≤0.003). The authors concluded that intraocular injections of Bevacizumab at 6-week intervals over 6 months are an acceptable form of treatment for patients with MO secondary to CRVO.

*Ophthalmology 119:1184-1189*

In Vivo Evaluation of Focal Lamina Cribrosa Defects in Glaucoma

This study assessed focal lamina cribrosa (LC) defects in glaucoma patients and control subjects using enhanced depth imaging OCT, and investigated their spatial relationships with neuroretinal rim and visual field loss. Ninety-eight focal LC defects representing LC tissue loss were found in the glaucoma group vs. none in the healthy subjects. Focal defects tended to occur in the inferior/inferotemporal periphery of the LC including at its insertion. Eyes with focal LC defects limited to the inferior half of the optic disc showed greater ‘sensitivity loss’ in the superior visual hemi-field, and vice-a-versa. These results suggest that focal LC defects occur in tandem with neuroretinal rim and visual field loss.

*Archives of Ophthalmology 130:552-559*
Prevalence of Inflammatory Back Pain in Patients with Anterior Uveitis

This report investigated the prevalence of inflammatory back pain (IBP) in patients with Anterior Uveitis (AU) through patient surveys including the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and the EQ-5D Euro-QOL questionnaire. The results found that 66 out of 141 UV patients (~47%) were classified to have IBP. Patients with IBP had worse quality-of-life than those without. The authors advocate that Ophthalmologists use such questions regarding back pain to identify patients classified to have IBP to refer for early rheumatologic assessment.

*American Journal of Ophthalmology 153:1025-1032*

Effects of Silicone Hydrogel Contact Lenses On Eyelid Tissues

This study assessed the effects of refitting into Senofilcon A silicone hydrogel lenses on eyelid physiology, for example lid hyperaemia and papillae response. The results showed that Senofilcon A lenses, worn on a daily-wear basis and replaced every 2 weeks, did not produce any significant eyelid tissue changes in previous non-contact lens wearers (from baseline), and revealed either no change or a slight improvement in the eyelid tissue appearances of established contact lens wearers.

*Contact Lens Anterior Eye 35:112-117*

Relationship between Choroidal Thickness and Choroidal Circulation

The authors investigated the relationship between the choroidal thickness and choroidal blood flow in 25 healthy young Japanese subjects. Sub-foveal choroidal thickness was measured using enhanced depth imaging optical coherence tomography. Sub-foveal choroidal blood flow was evaluated using computerised tonometry and total choroidal blood flow using laser Doppler flowmetry. The results found no significant correlations between sub-foveal choroidal thickness and either total choroidal blood flow of sub-foveal choroidal blood flow. However, decreased sub-foveal choroidal thickness was associated with decreased refractive error and axial length.

*American Journal of Ophthalmology 153:1129-1132*
Diffuse lamellar keratitis after LASIK using femtosecond laser flap creation

de Paula et al. investigated the development of diffuse lamellar keratitis (DLK) after LASIK following femtosecond laser flap creation (Intralase device at 60kHz). DLK occurred in 92 (of 70 patients) out of 801 treated eyes. The results found that higher energy levels for flap creation and a larger flap diameter was associated with an increased risk of DLK. However, there were no significant associations between the incidence of DLK and pre-operative refractive error, flap thickness, ablation depth, or any other treatment parameters.

Journal of Cataract and Refractive Surgery 38:1014-1019

Most fascinating research article of the month

The Impact of Severity of Parental Myopia on Myopia in Chinese Children

Xiang and colleagues evaluated the impact of the severity of parental myopia in 1567 Chinese children aged between 12 and 15 years in Guangzhou. As expected, severe myopia (> -6.00 D) in one parent resulted in an increased risk of myopia in their off-spring. Interestingly, however, most highly myopic children (> -6.00 D) did not have a highly myopic parent. Furthermore, 45 % of highly myopic children reported no history of parental myopia. These findings suggest that whilst genetic factors contribute to the development of more severe myopia, environmental factors also contribute to the high myopia found in the children of Guangzhou.

Optometry and Vision Science 89: 884-891
“Accuracy and Repeatability of Self-Measurement of Interpupillary Distance”

This study determined the accuracy and repeatability of 52 healthy and naïve participants at determining their own interpupillary distance (PD) using a mirror. Participants also had their PD measurements taken by a trained examiner using both a PD rule and an optical pupillometer. The results found that participants’ ability to measure their own PD resulted in both poor accuracy and repeatability. These results may have serious implications for patients who attempt to purchase spectacles over the internet using self-measured PDs.

*Optometry and Vision Science 89: 901-907*